NUTRITIONAL STUDIES ON *OOSPORA LACTIS*

BY

BRUCE EDWARD ELLICKSON

B.S., University of Illinois, 1943
M.S., University of Illinois, 1947

AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN DAIRY PRODUCTION
IN THE GRADUATE COLLEGE OF THE
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A study has been made in this work of the nutritional requirements of *O. lactis*. This mold is frequently encountered in milk or cream which is allowed to stand for several days or longer. The importance of this mold in the dairy industry is enhanced by the fact that it will grow under a wide variety of conditions.

A literature survey indicated that little had been reported on the nutritional requirements of this organism. Linossier in 1916 and 1917 made studies of the nutrition of this mold but it was considered advisable to expand that knowledge and to reevaluate it in the light of advances made in nutrition.

The work presented in this thesis is concerned with the basic requirements for the growth of *O. lactis*. A study has been made of its mineral requirements, of carbon and nitrogen sources necessary for good growth and comparisons in amounts of growth on these different sources. The vitamin and amino acid requirements of *O. lactis* have also been studied. Comparisons between individual strains on different carbon and nitrogen sources were made.

In order to determine amounts of growth quantitatively a gravimetric method of weighing mold mycelia collected in Gooch crucibles was used. Uninoculated controls indicated that the method was reliable.

Ten different basal media were tested and three of them chosen for use in the study of carbon and nitrogen sources. Lihtium, copper, silver, mercury, aluminum, antimony, cobalt, and nickel cations showed inhibition of growth of the mold. Magnesium, calcium, zinc, barium, lead, bismuth, molybdenum, potassium, and ferrous and ferric iron failed to inhibit *O. lactis*.

Twenty-five nitrogen containing compounds were tested as nitrogen sources. Of these compounds the more complex

organic nitrogen compounds gave the best growth but simple ammonium compounds were able to support growth. A study has been made in this work of twenty-seven carbon containing compounds as carbon sources for *O. lactis*. From these the best growth was obtained from mannose, sorbitol, galactose, dextrose, and glycerol. *O. lactis* utilized tristearin, trimyristin, and a commercial salad oil quite readily as carbon sources.

O. lactis was found capable of growing in eighteen amino acids using them as sole nitrogen sources. No actual requirement for any of the amino acids was demonstrated. Methionine, lysine, glutamic acid, leucine and arginine were found to be the most easily assimilated. Cystine, tryptophane, isoleucine, histidine and serine appeared to be the least readily assimilated.

Eight strains of *O. lactis* originally isolated and described by Parfitt and Sorenson in 1935 were tested with different nitrogen and carbon sources. Strain A exhibited the greatest nitrogen assimilating ability while Strain D seemed to grow poorly on all the nitrogen compounds tested. In testing the carbon sources a greater variability in response was noted than in the nitrogen sources. Levulose, maltose, inulin, arabinose and dextrose were good carbon sources for all eight strains.

Studies of vitamin effect on *O. lactis* showed that biotin is stimulatory in the first twenty-four hours of growth. However *O. lactis* showed no definite vitamin requirements.

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VITA

The author was born January 10, 1917 at Chicago, Illinois. He was graduated from York Community High school in Elmhurst, Illinois and attended the University of Illinois where he received the degree of Bachelor of Science in Bacteriology in 1943. He spent three years in the United States Army and returned to the University of Illinois for the degree of Master of Science in Bacteriology in 1947. He has been a research assistant in the Illinois State Water Survey and a teaching and research assistant in the Dairy Bacteriology division of the Department of Dairy Production of the College of Agriculture at this University. The author is a member of Sigma Xi, Phi Sigma, the Society of American Bacteriologists and the American Association for the Advancement of Science.

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